

Back to the Beginning

wood, who sent out invitations at short notice. Otherwise a unique occasion to honour the memory of the Wright brothers would have been missed.

In the event, the Royal Aeronautical Society was represented by its president, Dr. Roxbee Cox, and the Royal Aero Club by the secretary-general, Col. Preston. The Air Ministry and the Royal Air Force were also represented, and Sir Ben Lockspeiser represented research. In a private capacity several pioneers of British aviation attended. They included Sir Alliott Verdon-Roe, who was one of our earliest experimenters, and who, by designing the 504 in 1913, laid the sound foundations of the now-famous Avro firm; Sir Francis McClean, to whose generosity the establishment of Short Brothers as the first British aircraft constructors was largely due, and who made it possible for the Wright biplanes to be built in this country; it was unfortunate that Mr. Oswald Short was unable to make the journey from his Cornwall home. Sir John Buchanan, a vice-president of the Royal Aeronautical Society and for many years Director of Technical Development in the Air Ministry and Ministry of Aircraft Production. Mr. W. O. Manning, who began to design aircraft in 1909 or so. Dr. A. P. Thurston, who worked with Sir Hiram Maxim at the beginning of this century. It was good to see these old-timers at the ceremony.

The handing-over speech was made by the Minister of Education, Mr. George Tomlinson, who emphasized the remarkable progress made in flying since that memorable day in 1903. The Wright biplane was accepted officially by Mr. L. Satterthwaite, American Civil Air Attaché, on behalf of his Government. He thanked Britain for having guarded this historic aircraft so well during a period of twenty years. Here it is not inappropriate to remind readers that Mr. Satterthwaite has paid England a nice compliment by using a Spitfire as his personal aircraft.

Now that the Wright machine can no longer be inspected, a few reminiscences of the early flying days may be of interest. When Wilbur and Orville Wright first began to experiment, they soon discovered that the data on aerodynamics published up till that time were quite unreliable and misleading. They decided to find out for themselves, and designed and built a small wind tunnel in which they tested hundreds of model aerofoils in order to determine the best shape. They examined the problems of airscrews, and came to the conclusion that low revolu-

tions gave the greatest efficiency. They therefore employed chain gearing between engine and propellers; not only so, but they crossed one of the chains so that the two propellers revolved in opposite directions. They experimented with gliders built on the basis provided by their researches. They realized that warping the wings (wing-warping was used by them instead of the ailerons favoured by some French experimenters) caused the machine to yaw, and so they connected the rudder control to the lateral control. What was, perhaps, as remarkable as anything they did, the Wright brothers designed and built their own engine, a four-cylinder water-cooled. It gave about 12 h.p., but was deemed sufficient for flight, once the machine was in the air. For the take-off, use was made of a dropping weight in a low tower, and a starting rail. Thus the Wrights also became the first to apply assisted take-off successfully.

The one thing which, surprisingly enough, the brothers do not appear to have fully realized was the need, for stability in a fore-and-aft direction, of having the centre of gravity ahead of the centre of pressure, balancing the machine with a front elevator set at a greater angle than that of the mainplanes. Their front elevator was small and insufficiently loaded, so that elevator control was tricky. This oversight appears the more remarkable when one realizes that the brothers discovered in their wind tunnel that cambered aerofoils have an unstable centre of pressure movement.

The First Power-driven Machine

In the first machine, in which Orville made the first flight on December 17th, 1903, the pilot lay prone on the lower wing, and the engine lay on its side beside him. They had fully realized the importance of reducing drag, and in a statement made to the Aero Club of New York in 1906, there occurred a sentence which is as true to-day: "The best dividends on the labour invested have invariably come from seeking more knowledge rather than more power." The front elevator in this first machine was operated by the pilot's left hand, and the wing-warping and its interconnected rudder control was by moving the body from side to side. This arrangement was abandoned in later machines, and both the pilot and the engine, as well as the passenger, sat upright, a comfort which was doubtlessly paid for in extra drag. There were, on the later types, two upright control sticks, of which the left operated the elevator while the right warped the wings. The rudder was controlled

by a short handle pivoted on the top end of the wing-warping stick.

The original British patent specification gives a clear indication of how thoroughly the Wright brothers understood their problems. One of the pictures published herewith is a reproduction of a page in the April 25th, 1908, issue of *The Automotor Journal*. This journal carried for many years a section devoted to flying until, in 1909, Mr. Stanley Spooner, its proprietor and editor, decided to launch *Flight* as a separate journal.

The original Wright Patent Drawings, as published in "The Automotor Journal" (precursor of "Flight") of April 25th, 1908.

